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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,608	11/21/2003	Anna Lee Y. Tonkovich	B-1479-CIP-DIV	8190

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EXAMINER	
BHAT, NINA	

ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 12/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/717,608	TONKOVICH ET AL.	
	Examiner	Art Unit	
	N. Bhat	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21 and 41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21 and 41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The examiner acknowledges applicant's election without traverse of claims 22-40 in the letter of September 28, 2006. However, as explained to applicant in the telephonic communication of November 29, 2006, the restriction/election requirement is moot in light of the preliminary amendment, which was made on November 21, 2003, which cancelled claims 22-40. Claims pending are claims 1-21 and newly added claim 41.

2. Action on the merits of claims 1-21 and 41 follows:

3. Applicant is requested to update the continuity data on Page 1, line 1 of the specification to recite "This application is a divisional of 09/640,903, filed August 16, 2000 now US Patent 6,680,044 which is a continuation in part of 09/375,614, filed August 17, 1999 now US Patent 6,488,838.

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1-3,5-7, 9-10, 13-21 and 41 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-21 of U.S. Patent No. 6,984,363. Although the conflicting claims are not identical, they are not patentably distinct from each other because although the conflicting claims are not identical, they are not patentably distinct from each other because both inventions claim a chemical reactor which includes at least one reactor micro channel having at least one wall defining a bulk flow path through which at least one gas phase reactant can pass, a catalyst structure disposed within the microchannel, and that the catalyst includes a porous catalyst material that has pore size to permit molecular diffusion within the catalyst material, the catalyst structure comprises a porous material as a non-catalytic material with a catalytic material on the porous surface area, the porous structure has geometrically regular porosity, the porous structure is in the form of a foam or felt, the porous structure has a pre size of from about 0.1 microns to 200 microns, the porosity is between 30-98%, the size of the micro channels described in the '363 patent are within the same size range as claimed in the instant invention but does not specifically recite the cross-sectional area limitations as claimed in claim1, but based on the geometries as claimed the cross-sectional area limitations would be obvious if not inherently met and to modify the size, shape, geometry which maximizes surface area or reaction area within the reactor to improve heat, mass and diffusion transfer within the reactor would have been obvious from the invention of the instant application. To reiterate to include the dividers as claimed and baffles would have been obvious expedient because to

improve mixing and reaction conditions within a reactor are well known to the ordinary artisan. It is maintained that because essentially the same reactor has already been claimed in the '363 patent, the reactor has a size in length, width and height within the same range as claimed in the instant application and therefore, to provide the cross-sectional area comprising the porous catalyst which is disposed within the micro channels would have been obvious to one having ordinary skill in the art since the dimensions of the reactor are essentially the same.

5. Claims 1-3, 5, 9-12, 13-19 and 41 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 12-19 of U.S. Patent No. 7,045,114. Although the conflicting claims are not identical, they are not patentably distinct from each other because both applications claim a reactor which includes a microchannel reactor which includes a porous catalyst insert, at least one heat exchanger in thermal contact with the reaction chamber, the heat exchanger includes an inlet and outlet, a reaction chamber which has a size and shape or geometry which is larger than what has been claimed by applicant but does claim that the reactions chambers have a diameter of 2 cm or less or has a height less than or equal to 2 inches and the heat exchange channel has a thickness in the range of 0.1 to 10 mm. However, the '114 patent does not teach applicant's specific cross-section area but does teach applicants open cells ranging from 20 ppi to about 3000ppi which is within the range as claimed by applicant. It would have been obvious from reading the '114 patent to provide the cross-sectional area as claimed in claim 1 of the instant application based on the geometries as claimed and taught in the patent, and it is of the

examiner's opinion that the cross-sectional area limitations would be obvious if not inherently met and to modify the size, shape, geometry which maximizes surface area or reaction area within the reactor to improve heat, mass and diffusion transfer within the reactor would have been obvious from the invention of the instant application. To reiterate to include the dividers as claimed and baffles would have been obvious expedient because to improve mixing and reaction conditions within a reactor are well known to the ordinary artisan. It is maintained that because the same reactor has been substantially claimed in the '114 patent, i.e., the microchannel has a size in length, width and height within the same range as claimed in the instant application to provide the cross-sectional area comprising the porous catalyst which is disposed within the micro channels would have been obvious to one having ordinary skill in the art at the time the invention was made.

6. Claims 1-3, 9-16 and 41 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 and 11-17 of U.S. Patent No. 6,660,237. Although the conflicting claims are not identical, they are not patentably distinct from each other because both the instant application and that of the '237 patent claim a microchannel reactor having a catalyst structure comprising a porous structure having a pore size of at leas 0.1 microns and wherein the catalyst structure is disposed within the micro channel reactor. The pore size as claimed in the '237 overlaps in range with the porosity claimed in the instant application. The micro channel reactor includes heat exchange means in constructive relationship with the microchannel reactor. The porous structure, which supports the catalyst, is a foam, felt or wad. However, the '237

patent does not teach applicant's specific cross-section area but does teach applicants open cells ranging from 20 ppi to about 1000 ppi which is within the range as claimed by applicant. It would have been obvious from reading the '237 patent to provide the cross-sectional area as claimed in claim 1 of the instant application based on the geometries as claimed and taught in the patent, and it is of the examiner's opinion that the cross-sectional area limitations would be obvious if not inherently met and to modify the size, shape, geometry which maximizes surface area or reaction area within the reactor to improve heat, mass and diffusion transfer within the reactor would have been obvious from the invention of the instant application. To reiterate to include the dividers as claimed and baffles would have been obvious expedient because to improve mixing and reaction conditions within a reactor are well known to the ordinary artisan. It is maintained that because the same reactor has been substantially claimed in the '237 patent, i.e., the microchannel has a size in length, width and height within the same range as claimed in the instant application to provide the cross-sectional area comprising the porous catalyst which is disposed within the micro channels would have been obvious to one having ordinary skill in the art at the time the invention was made.

7. With a timely filed and properly executed Terminal Disclaimer this application would be in condition for allowance as the prior art fails to teach and or suggest a microchannel reactor comprising at least one reaction chamber comprising at least one porous catalyst material and at least one open area wherein each of the at least one reaction chamber has an internal volume defined by reaction chamber walls, wherein the chamber height or chamber width is about 2 mm or less, the chamber height and

width defining a cross-sectional area wherein the cross-sectional area comprising a porous catalyst material and an open area, wherein the porous catalyst materials occupies 5% to 95% of the cross-sectional area and wherein the open area occupies 5% to 95% of the cross-sectional area and wherein the open area in the cross-sectional area occupies a contiguous area of 5×10^{-8} to 1×10^{-2} m^2 and wherein the porous catalyst material has a pore volume of 5 to 98% and more than 20% of the pore volume comprises pores having sizes of from 0.1 to 300 microns.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sakai teaches a reactor for conducting reforming reactions. The apparatus includes a porous substrate and a hydrogen separating film formed on a predetermined surface portion of the porous substrate, which selectively separates hydrogen , and includes a reforming catalyst for reforming the hydrocarbon being supported in the pores of the porous substrate. There is nothing in the reference which would lead on of ordinary skill in the art to provide a microchannel reactor as claimed in the instant applicant, there is not sizing where one having ordinary skill in the are would come up with the cross-sectional area of the porous catalyst material and open area as claimed in the instant invention. Bergh teaches a chemical processing microsystem comprising parallel flow micro reactors. The reactors are microchannel reactors but does not specifically teach the cross-sectional area comprising porous catalyst material and an open area in the range as claimed by applicant and specifically would not lead on having ordinary skill in the art to provide a microreactor wherein the open area in the cross-sectional area occupies a contiguous area of 5×10^{-8} to 1×10^{-2} m^2 and wherein

the porous catalyst material has a pore volume of 5-98% and more than 20% of the pore volume comprises pores having sizes form 0.1 to 300 microns as claimed. Losey et al. teach a microfabricated chemical reactor comprising a plurality of lamina, an inlet port formed in at least one of the lamina and an outlet port formed in at least one of the lamina. Losey et al. teach that the chemical reactor includes a particle filter disposed in the continuous channel and wherein the particle filter restricts flow through the continuous channel and retains catalyst or other particles within the continuous channel. There is no teaching of the cross-sectional area comprising porous catalyst material and an open area in the range as claimed by applicant and specifically would not lead on having ordinary skill in the art to provide a microreacotor wherein the open area in the cross-sectional area occupies a contiguous area of 5×10^{-8} to 1×10^{-2} m^2 and wherein the porous catalyst material has a pore volume of 5-98% and more than 20% of the pore volume comprises pores having sizes form 0.1 to 300 microns as claimed. Tonkovich et al. teach a chemical reacotr and method for gas phase reactant catalytic reactions this is the parent to the instant application. Tonkovich et al. teach a process for conducting equilibrium limited chemical reaction in a single stage process channel. The reactor employed is a microchannel reactor having a cross-flow heat exchanger and is a related case to the instant application and includes one or more same inventors. Wang et al. teach a catalyst structure, reactor and method for conducting Fischer-Tropsch reactions. This patent is within the same patent family as the instant application and includes one or more same inventors. Tonkovich et al. '363 is related to

the instant invention as a continuation in part and accordingly is of the same patent family.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Bhat whose telephone number is 571-272-1397. The examiner can normally be reached on Monday-Friday, 9:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

N. Bhat
Primary Examiner
Art Unit 1764